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x in	*y* in.	Mag. in.	Star.	B.A.C.
34·76	7·18	3·7	σ Orionis	1780
·79	4·11	5	12 Monoc.	2123
34·90	0·93	5	6 Can. Min.	2473
35·08	7·54	4·7	*c* Orionis	1759
·18	7·60	4	θ' ,,	1758
·28	7·65	3	ι ,,	1762
·30	1·37	5·3	ε Can. Min.	2451
·38	6·30	5·3	..	wanting
·42	1·29	5	γ Can. Min.	2468
·52	1·39	3	β ,,	2462
·60	3·67	5	18 Monoc.	2222
35·83	4·74	5·3	..	wanting

The Rich Nebular Regions in Virgo and Coma Berenices.

By Richard A. Proctor, B.A. (Cambridge).

In the maps which illustrate my papers on the distribution of the nebulæ, in Vol. xxviii. of the *Monthly Notices*, the nebulæ are not shown in their true places, but are simply arranged according to their numerical distribution in spaces having given limits in R.A. and Dec. While engaged in the construction of these maps, it occurred to me that considerable light might perhaps be thrown on questions relating to stars and nebulæ, if maps were constructed on an adequate scale, showing the stars down to telescopic orders of magnitude, and all the known nebulæ, properly placed. It is clear that to construct such maps for the whole heavens would be a work involving several months of labour, and it is seldom that I can find even a few hours of leisure for such work. I have, however, begun to prepare maps of the most interesting nebular regions, and I now present two such maps—one showing the rich nebular region in the wing of *Virgo*, the other the rich region in *Coma Berenices*. The former map contains upwards of 250 nebulæ, the latter containing some 80; and in both maps all the stars in Argelander's series of charts (corrected for precession, so as to accord with the date of Sir John Herschel's Catalogue of Nebulæ) have been included. Thus the maps show all the stars down to Herschel's 11th magnitude, or to the magnitude intermediate to Argelander's 9th and 10th.*

* I say down to these magnitudes; but there are many who prefer to speak of the fainter orders of stars as belonging to the higher orders of magnitude. It would be well that some definite rule should be adopted in this matter. My own sole reason for speaking of the brighter orders as the higher orders is that I find that mode of speaking to be more in accordance with ordinary ideas on the subject than that which calls a very faint star a star of a high order of magnitude. Authority is divided on the subject, some astronomers adopting one mode of speaking, while others use the other. Hence some confusion is apt to result.

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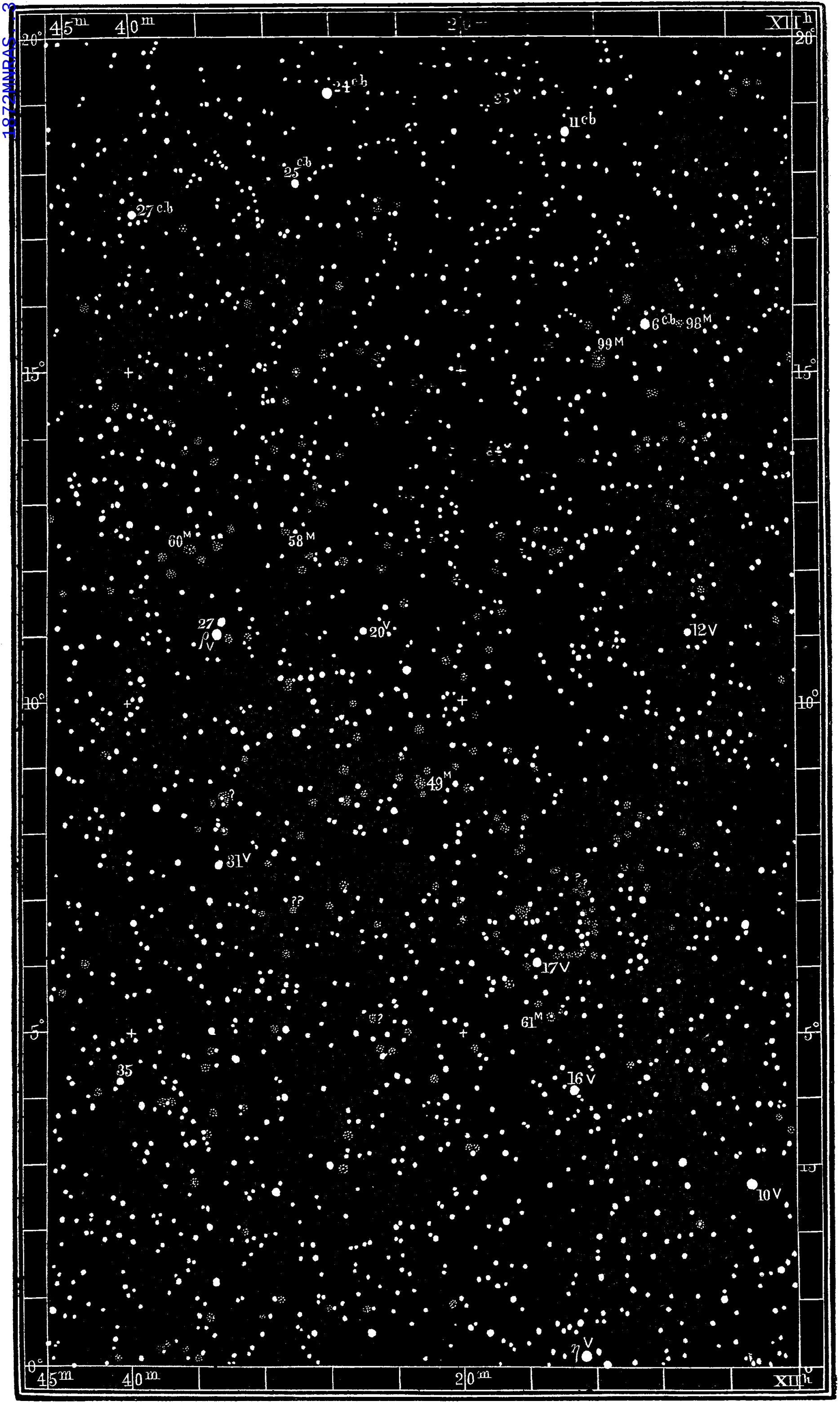

The Nebular Region in *Virgo*.

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The larger map extends from $12^h\ 0^m$ to $12^h\ 45^m$ in R.A., and from the equator to 20° in north declination. Thus it covers about $\frac{1}{195}$th part of the whole heavens, and the average proportion of nebulæ for that extent of surface would be about 28. Since it contains more than 250, its relative richness is unmistakable.

The smaller region extends from $12^h\ 32^m$ to $13^h\ 12^m$ in R.A., and from 23° to 38° in north declination. In the most northerly part of the map, however, the range in R.A. is about a degree and a half greater. The area is about $\frac{1}{360}$th part of the heavens. The average proportion of nebulæ would be 15, the actual number is more than five times as great.

In drawing these maps, I have been much struck by a circumstance which may perhaps not seem particularly well marked on a casual examination of the maps, but which has a real existence nevertheless. The stars are not arranged uniformly over either region, but to some degree clusteringly with interspersed spaces relatively vacant. Now no nebulæ appear in the more vacant spaces, nor do nebulæ appear chiefly where the stars are most clustered. It is on the borders of star-clusterings, and in the breaks of star-streams, that the nebulæ show themselves, precisely as though they had taken the place of stars where star-matter began to fail.

This result is in agreement with what Sir W. Herschel observed as to the relation between nebulæ and the fainter telescopic stars; for it was not in absolutely starless regions—or rather, it was not in regions *merely* starless—that he found nebulæ richly spread. It was when in his sweepings he found stars beginning to fail after having been richly spread that he called to his assistant Miss Caroline Herschel, to "prepare to write, for he found himself approaching nebulous ground."

I cannot but regard the relation here stated to exist in the maps as full of significance. After going carefully over the whole ground in mapping, I have convinced myself that the peculiarity has a real existence, that it cannot be ascribed to chance. The peculiarity recognised by Sir W. Herschel is equally striking, and we know that he was by no means disposed to regard it as merely accidental. Taking the two features, or rather the two forms of one and the same feature, into due account, it seems to me impossible to doubt that there is in these regions a real association between nebulæ and stars. The nebulæ here, at any rate, would seem not to be external star-systems.

If it should at any time become possible to compare the proper motions of these nebulæ (some of which are gaseous) with those of the stars—either the apparent proper motions in the heavens, or motions of recess or approach—evidence of importance might be obtained respecting the relative distances of stars and nebulæ in these regions. I entertain very little question as to the result of such researches. I would not venture, indeed, to assert that any marked community of motion will be

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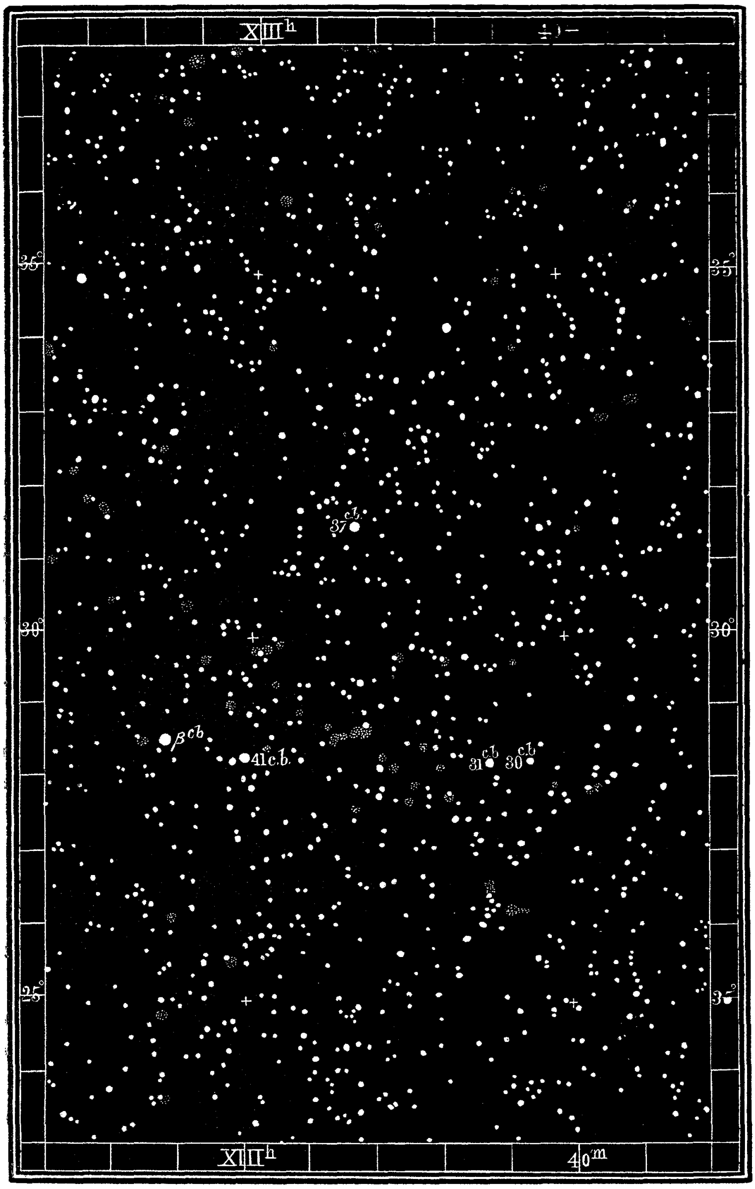
recognised when nebulæ and stars are compared ; but I feel confident that the average rate of apparent nebular motion will be found to correspond with the average rate of stellar motion, and



The Nebular Region in *Coma Berenices.*

that no discrepancy will be found to exist between the *general* character of the stellar and nebular motions in the direction of the line of sight.
